Twenty-five of the 71 cases died within ten months from the beginning of this study, the majority of the deaths so far as could be determined attributable to the cardiac condition directly. The relationship of the degree of alternation to prognosis was as one would anticipate, the greater the degree the shorter the life after the pulse discovery.

Arteriosclerosis of heart and kidneys was found in the only three cases examined postmortem.

It gives the writer pleasure to acknowledge his indebtedness to members of the hospital staff for their coöperation.

MODE OF ACTION AND USE OF EMETIN IN ENTAMEBIASIS.

By Randolph Lyons, M.D.,

INSTRUCTOR AND LECTURER IN MEDICINE, DEPARTMENT OF MEDICINE, TULANE UNIVERSITY, NEW ORLEANS.

The value of emetin in amebic dysentery is so well established that the further report of cases successfully treated would scarcely be of general interest at the present time. The literature on the subject is rapidly becoming voluminous, but the present status of the drug in the treatment of amebiasis has been excellently summed up in a rather recent paper by Vedder.[1] During the past eight months still further facts have come to light, so that the present communication will be limited to a practical discussion of the advances made in our knowledge concerning the mode of action of the drug, best methods of administration, dosage, ill effects, relapses, and other points of interest. In considering the mode of action of emetin in entamebiasis it will be necessary to inquire somewhat briefly into the habits and habitat of amebas in the body, and while some of the views expressed may be later proved incorrect, they at least permit of a rational basis for therapy.

Mode of Action of Emetin and Ipecac in Entamebiasis. The exact manner of action of ipecac and emetin in amebic disease was until a few years ago very indefinite. In the old days of ipecac therapy there were many theories but few facts. It can be stated now from experimental and clinical evidence that emetin is the active principle of ipecac from the amebecidal point of view. In 1912 Rogers[2] by the subcutaneous and intravenous use of emetin demonstrated that it owes its action chiefly at least to absorption

[1] Origin and Present Status of the Emetin Treatment of Amebic Dysentery, Jour. Amer. Med. Assoc., 1914, lxii, 501.

[2] Rapid Cure of Amebic Dysentery and Hepatitis by Hypodermic Injections of Soluble Salts of Emetin, British Med. Jour., June 22, 1912, p. 1424.

into the blood stream with resultant destruction of the amebas in the tissues. It matters not whether the amebas be in the tissues of the colon, liver, or gums of the mouth.

The question arises, Has emetin or ipecac any effect upon amebas not in the tissues or within reach of the circulation but in the lumen of the large intestines? Carter[3] believes that in giving the whole drug (ipecac in salol-coated pills) by mouth and emetin by needle that by the former method we insure that the intestinal contents are thoroughly permeated with the drug and in the latter we reinforce the amebecidal effect of the parent drug upon the parasites buried in the wall of the affected intestines by the hypodermic injections of emetin carried to them by the blood stream. He is convinced that acute amebic dysentery requires the entire root with all its alkaloids as well as emetin. If we accept these statements as true, undoubtedly our new treatment with emetin injections must be modified or rather complicated by the simultaneous oral use of large doses of ipecac. In short, we must return to the old, cumbersome ipecac therapy plus our emetin by needle. Do the facts justify the assertion that by giving ipecac orally we can thoroughly permeate the intestinal contents with the drug? In order to answer this question satisfactorily it is essential to know how ipecac or its active principles are eliminated from the body. Unfortunately all the text-books on modern pharmacology to which I have had access are uniformly silent upon this point. In hope of throwing a little light upon this subject the following investigation was made in 1912.[4] Stools from patients receiving ipecac in which no amebas had been found for at least two or three days were collected, filtered, and the filtrate sterilized by heat. The sterile fecal filtrates were added to growths of amebas *in vitro* and allowed to remain in contact for varying lengths of time. The result was that the amebas remained practically unaffected, showing that the feces contained none at least of the amebecidal constituents of the ipecac. This is the only experimental evidence I am aware of against the elimination by the large bowel of the amebicidal principles of ipecac (chiefly emetin). The experiment, however, still lacks confirmation. Furthermore, it has been demonstrated *in vitro* that emetin (also ipecac) is highly destructive to practically all species of amebas. Even clinically, evidence[5] has recently come to light showing the specificity of emetin on a species of amebas found in the alveolar tissues in Rigg's disease.

There exists in the intestines of many normal individuals the harmless *Entameba coli.* This organism should be easily destroyed by emetin (or ipecac) if the drug is eliminated by way of the intestines. The following case will prove of interest in this connection:

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[3] Emetin and Ipecacuanha: Their Amebecidal Value in Pathogenic Amebiasis, Indian Med. Gaz., March, 1914.

[4] Observations on the Effect of Ipecac, Phenol, and Salicylic Acid in Vitro, New Orleans Med. and Surg. Jour., 1912, lxiv, 884.

[5] Protozoa of the Mouth in Relation to Pyorrhea Alveolaris, Dental Cosmos, 1914, lvi, 948.

In 1913 I had occasion to treat a physician of this city for a chronic diarrhea. He had contracted amebic dysentery in Cuba seven years previously. Two years later he took a thorough course of ipecac, but a moderate diarrhea still continued. In 1912 a sigmoidoscopic examination revealed nothing abnormal. When seen by me in November, 1913, he was having a few loose stools early in the morning, but later the passages would become solid. The stools showed fermentation and were not dysenteric in character. Microscopically there was no blood or pus but some mucus, trichomonads, and also what appeared to me to be typical *Entambœ coli*. Because of the patient's suspicious past history he was given therapeutic test with emetin. One grain of the hydrochlorid was injected daily for seven days. At the end of this period there was no improvement. Examination of the stool still showed vegetative entamebas (small, granular, sluggishly motile amebas, with well-defined nuclei). Under diet, rest, and attention to kidneys the patient was markedly improved.

The result of this case adds further weight to the contention that emetin is not eliminated from the blood stream by way of the alimentary tract otherwise the *Entamebœ coli*, which are simply harbored in the intestines should have been readily destroyed. The non-pathogenicity of the colon entameba is due in all probability to the fact that it does not penetrate the intestinal mucosa. This explains why neither ipecac nor emetin, orally or by needle, has any effect upon them. By analogy the pathogenic entamebas which are free in the intestinal canal should remain unaffected by our specific medication and cause no symptoms. Such is found to be the case in the carrier state. Finally, the amebicidal action of ipecac and emetin is limited then to the amebas in the tissues. When these are all destroyed the lesions heal with remarkable rapidity and the patient is cured.

Relapses and Carriers. Unfortunately in a certain proportion of cases we find that relapses occur or the patient remains well, but his stools still contain the pathogenic entamebas and the individual becomes a carrier. Just why a relapse occurs in one case and the carrier state in another cannot be explained satisfactorily at present. Naturally both conditions depend upon the survival of some of the entamebas.

To enter into a slightly more detailed discussion of this subject might appear, at first sight, to be only of theoretical interest, but it will be found, when we come to therapy, to be of considerable practical value, as we do not treat the two conditions alike.

Relapses, in most instances, are due to the fact that some of the amebas escape destruction by encystment. In this stage they are resistive to any form of medication and produce little, or at times, no local irritation. From careful history taking in some 80 cases of amebic dysentery I have found that in the majority of instances it will be noted that even in periods of improvement or apparent well-being the patient will usually admit that he experiences some slight abdominal discomfort or unnatural feeling in spite of the fact that the stools were apparently normal. From this I am strongly inclined to believe that in the majority of cases some of the cysts remain imbedded in the tissues of the colon and are not simply harbored in the large intestine in the same manner as the *Entamebæ coli.* For if such were the case there should be complete absence of symptoms in the intervals of remission. The relapse takes place then when conditions are favorable for the encysted forms to again become vegetative.

In the carrier state it would appear however, that conditions are somewhat different. Here the individual who is a menace[6] to the community is himself apparently immune to the organism which simply lives in his intestines. What it is that protects the intestinal mucosa in such a case from penetration by the parasite is not known, but this fact constitutes the essential difference between the two states.

MODES OF ADMINISTRATION. There are at the present time four routes by which emetin has been introduced into the body: the subcutaneous, the intravenous, the oral, and the rectal. It is important for effective therapy to know the advantages and disadvantages of each method. In the following discussion the hydrochloride of emetin will only be considered, with occasional reference to ipecac.

The Subcutaneous and Intravenous Routes. For practical purposes these two methods of administration may be considered together. The intravenous route is only necessary in exceptional cases and does not differ from other intravenous medication.

With regard to the subcutaneous injections of the drug there are several facts to be borne in mind: (1) that the alkaloid emetin is slightly irritating, and (2) the hydrochloride is slightly acid in reaction (the degree of acidity varies somewhat in preparations from different pharmaceutical houses). Where a small dose is injected, such as one-third grain, both of these factors are negligible, as the product is rapidly absorbed into the circulation. On the other hand if a large dose is administered (as one grain) considerable local pain and inflammation results, owing to the concentration of the factors just mentioned. Intramuscular injections cause still more discomfort. The inflammatory reaction thus produced at the site of inoculation may persist as an infiltrated area for from one to two weeks. It is more than probable that such a reaction seriously retards the rapid absorption of the drug.

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[6] Walker and Sellards, Experimental Entamebic Dysentery, Philip. Jour. Sci., 1913, Sec. B., No. 4, 253.

For these reasons where prompt and lasting effect is desired, small repeated injections are far preferable to large single doses.

Oral Route. When emetin is administered by mouth it is highly probable, from what has been previously stated, that the drug is absorbed into the blood stream in the small intestines and is not eliminated by way of the colon in the fecal matter. The drug is usually taken in salol or keratin-coated pills:

My first experience with this method occurred in April, 1913, in a man aged forty-four years, with a severe dysentery and hepatitis. Because of the urgency of the symptoms (fever, abdominal pain, large tender liver, and leukocytosis) it seemed important to get the patient rapidly under the influence of the drug. He was accordingly given one-third grain of emetin hydrochloride by needle and by mouth, twice a day, that is, a total of one and one-third grains daily. The emetin was put up in one-third grain salol-coated pills. Ignorant of the contents of the pills the patient thought from the effect that he was taking a drastic purgative. There was considerable abdominal discomfort and a marked increase in the number of stools. After two days it was necessary to stop the drug by mouth and improvement rapidly ensued.

This irritant action of emetin when taken by mouth is well exemplified in a case I was called in to see by Dr. Matas through whose courtesy I am reporting it. The circumstances are briefly as follows:

The patient was a white male, Italian, aged seventy years. Admitted to the Charity Hospital in November, 1913. The disease began one month previous to admission with a bloody diarrhea. The diagnosis of hepatic abscess was made and the patient was operated upon by Dr. Matas. Two days after the operation the patient was put on emetin, and given one grain by needle daily. In less than two weeks he was entirely free from temperature. The patient then refused further injections of emetin because of the soreness of his arms. Thereupon it was decided to continue the emetin by mouth in the same dosage, the ampoules being simply emptied into water. This solution caused no vomiting but his stools began to increase in number. Ten days later, when I was asked to see him, his bowels were extremely loose and he was very emaciated and feeble. Examination of the stools failed to show amebas but there were blood clots, pus, and mucus present. Recalling my first experience with the oral method I advised simply discontinuing the emetin. The patient made a slow but uneventful recovery. When seen two months later he had had no further return of his amebic affection.

Here we have the curious spectacle of a man being cured and killed by the same drug. Undoubtedly the administration of emetin was prolonged unnecessarily. Another surprising fact was the ability of the patient to retain large doses (one grain) of the drug by mouth.

In order to determine the amount of gastric and intestinal irritation produced by the oral ingestion of smaller doses, the writer took a half-grain of the same preparation of emetin in solution. This caused nausea and vomiting after an interval of an hour. This was followed in another hour by two loose stools accompanied by griping, and some abdominal discomfort persisted for five or six hours. After this experience, in order to avoid the psychic element, I gave one-half grain by mouth to an unsuspecting, healthy young negro. He suffered no nausea, but one hour and a half later he had two watery passages with considerable abdominal discomfort.

Low[7] reports good results in two cases of amebic dysentery in which he used keratin-coated tabloids in one-half grain doses at night. Vedder[8] has treated one case by this method without obtaining the striking results that follow the hypodermic use of emetin, and is therefore not in favor of it.

There is sufficient evidence at the present time to state that emetin should be given by mouth only under circumstances that do not permit of the hypodermic methods or of the administration of the whole drug (ipecac) by mouth, and then only in small doses (one-sixth to one-third grain).

Colonic Route. With reference to this method, Chauffard[9] reports a case of amebic dysentery in which under subcutaneous injections of emetin the stools decreased from fifteen to two or three daily. After reading the report of Marchoux on the treatment of dysentery with emetin enemata, he decided to irrigate his patient with an emetin solution (100 mg. to 1000 c.c.). That day the patient had fifteen dysenteric stools. He looked upon this intestinal intolerance as due to the fact that this patient had been previously treated by subcutaneous injections of the drug.

Although I have never used emetin by enema, I am strongly inclined to agree with Vedder that this so-called intestinal intolerance was due to the direct irritant action of the drug on the intestinal mucosa.

The practical value of solutions of either emetin or ipecac for colonic irrigations is problematical, for the vegetative amebas will be easily destroyed if reached by many of our well-known agents, such as quinin, salicylic acid, silver nitrate, and others, while those in the tissues will not be acted upon.

Dosage and Duration of Treatment. The dosage of emetin originally recommended by Rogers was small. The average subcutaneous dose was one-third grain, and a total of two grains usually sufficed for an apparent cure. Later the pendulum swung in the opposite direction and amounts varying from two and one-half to four grains daily were injected subcutaneously, and even by vein in severe cases. The cause of this reaction was probably due to the fact that as time elapsed reports of relapses became more frequent. At the present time the most effective dose appears to be somewhere between these two extremes. For an ordinary case of amebic dysentery in an adult an average of one grain daily is sufficient. It is of course impossible to dogmatize upon this subject, as individualization is necessary. Mild cases may get along well on less than one grain and severe cases may require more. I have yet to see, however, a case that required more than two grains daily, provided the principle of repeated small injections was followed. The tendency in the early days of the emetin treatment was to stop the injections when the stools became formed. Experience has shown that it is better practice to continue the injections, as Dopter advises, for four or five days after the stools are apparently normal. Careful and systematic examination of the stools will be found to be one of the best guides to therapy.

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[7] Administration of Emetin by Mouth in Amebic Dysentery, British Med. Jour., 1913, No. 1, 1369.

[8] Loc. cit.

[9] Resultats inattendus d'un Lavement d'emetine chez un Dysenterique Amebien, etc., Soc. Méd. des Hôp., June 20, 1913.

In general the duration of treatment is from one to two weeks. It is seldom wise to prolong the administration of the drug beyond two weeks even though a diarrheal condition exists unless active entamebas are still present. The diarrheal condition may be due to an intestinal catarrh or an association bacillary infection, or possibly to the drug itself. In two cases that I have recently treated the diarrhea could apparently be attributed to the subcutaneous injections of emetin.

The first case was a college professor of forty years. He was treated by a colleague and put on ascending doses of emetin beginning with one-third grain and increased in four days to two grains a day. During the first few days of the treatment the patient's bowels were checked and the pain and tenesmus subsided. When the large doses of the drug were reached (fourth day) his bowels became loose again and abdominal discomfort returned. When I saw the patient he had taken a total of nine grains of emetin. As no amebas could be found the dose of the drug was reduced for a few days and then discontinued. The patient returned to his home and after two or three weeks the bowel disturbance disappeared. There has been no recurrence in the past four months.

The second case was a young colored male of twenty-eight years who had had a chronic dysentery for five or six years. He was given injections of emetin (one grain) daily for twelve days. Like the former case he at first improved rapidly, then an obstinate diarrhea set in. Examination of the stool showed blood-tinged mucus and a few resting amebas. The emetin was stopped and a saline enema given daily for five days, during which time the number of stools was notably lessened. Following this a short course of emetin by needle was again instituted. At the end of this course the stools were normal and a sigmoidoscopic examination negative.

These two cases favor the view that too large doses of emetin or too prolonged use of moderate doses may cause a diarrhea or be responsible for its persistence. In what way the subcutaneous injection of the drug causes intestinal irritation I am unable to explain. At all events, emetin is best administered in courses of a week to ten days and repeated at intervals if necessary. During the administration of emetin, moderate purgation with castor oil or a saline is often beneficial. It keeps the intestinal tract clean and mechanically washes out many of the entamebas in the gut. For a number of years I have made it a rule not to discharge a patient until he has been given a large dose of salts (one ounce), and the effect on the bowels carefully noted. In some cases that were thought to be cured, dysenteric symptoms returned and active amebas were found in the stools. The salts may be said to act as a therapeutic check upon our cures, though too much reliance should not be placed upon it.

Ill Effects of Emetin. Ill effects from emetin are rarely encountered unless the dosage is large or the administration prolonged for too long a time. I have already mentioned the probability of emetin by needle producing or keeping up a diarrhea. Allen[10] has produced nausea and vomiting by a single dose of four grains; no other ill-effects were noted. A mild peripheral neuritis occurred in a physician under my care who took, while in the country, one and one-third grains of emetin daily for sixteen days. During the last few days of the injections his legs became weak and he suffered with pains especially in the calves. There was also some general muscular weakness. This condition gradually cleared up after stopping the drug. Eshleman[11] reports a case that developed a general eruption, purpuric in character, associated with a severe peripheral neuritis. The patient had received two grains daily for five or six days. Weis[12] has observed peripheral neuritis in two cases following emetin, and believes it to be due to the use of too large doses. Spehl and Colard[13] report a case that had been given one grain for six days and then the dose increased to one and one-half grains daily. After a few days the patient developed a flaccid paresis of all muscles. There was edema of the face, rapid pulse, and diminished tendon reflexes. Recovery was slow. Serious symptoms have been met with after the intravenous[14] use of large doses of emetin. It will be found safer to adhere to the original dose proposed by Rogers for intravenous use (one grain).

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[10] The Emetin Treatment of Amebic Dysentery, Jour. Amer. Med. Assoc., 1913, lx, 664.

[11] Bull. of Touro Infirmary, New Orleans and Surg. Jour., 1914, lxvi, 965.

[12] Ibid.

[13] A Case of Emetin Poisoning, Provence Medical, April 18, 1914, p. 176.

[14] Baermann and Heinemann, Die Behandlung der Amoeben Dysenterie mit Emetine, Münch. med. Woch., 1913, lx, 1132.

In experiments on animals Vedder and Nichols[15] have demonstrated that the drug is fatal to certain laboratory animals in comparatively small doses (2.5 mg. per kg. of emetin intravenously, fatal to rabbit). The evidence is increasing in the literature to the effect that the drug is not as harmless as generally supposed and that large doses are not without danger.

RELAPSES AND CARRIERS. As mentioned in a previous paper[16] it is not always easy to state, in many instances, whether a relapse is a reinfection from within or a fresh infection from without. In reviewing my own cases and the literature in general I should judge approximately 25 per cent. of the cases have recurrences. Under ipecac therapy relapses appeared to be less frequent, though I doubt seriously if this were actually the case. It is quite true that patients once treated with large doses of ipecac[17] rarely return for a second course, at least, to the same physician, for many of them prefer to suffer the inconvenience of the disease or try a patent medicine. On the other hand few individuals object to the emetin treatment and readily return if not cured. Willets[18] believes that the apparent superiority of ipecac in percentages of cures is due to the fact that the dosage of emetin varied widely as well as its mode of administration, while the ipecac cases were treated more persistently than the emetin cases. Siebert,[19] who has had a wide experience with ipecac, considers the effect of emetin more lasting and that fewer cases relapse in the same time with emetin than with ipecac.

The pathology of relapse has already been discussed, and we find that they are due probably to the fact that some of the amebas in the tissues escape destruction by encystment. Attention to the principles of administration, dosage, and duration of treatment previously outlined will prevent relapses in some instances. Where the stools still contain entamebic cysts after apparent cure a recurrence is likely to occur. As these cysts cannot always be found it is a safe rule where possible to place all patients on the intermittent plan of treatment. I have followed, in a general way, Chauffard's[20] method, which consists in giving a second series of injections two weeks after the first, then a third after three weeks, and even a fourth after a like interval. In long-standing cases this may be continued at monthly intervals. The drug is given for four or five successive days. The dosage that I have used has been usually one-third grain, morning and evening. Before instituting the treatment the patient is given one ounce of salts in the morning and the first injection administered after the bowels have acted several times. This method was adopted in the hope that the intestinal congestion and watery stools caused by the saline might produce conditions favorable for the encysted entamebas to again become vegetative, when they would readily be affected by the emetin injections. There is no proof to this effect except, as previously stated, that intestinal irritation favors recurrences.

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[15] Loc. cit.

[16] Lyons, R., Treatment of Amebic Dysentery with Subcutaneous Injections of Emetin Hydrochloride, Jour. Amer. Med. Assoc., 1913, lx, 1216.

[17] Exception should be made in favor of alcresta ipecac which is not disagreeable to take.

[18] Preliminary Report on Treatment of Entamebiasis with Ipecac, Emetin-Neosalvarsan, Philip. Jour. Sci., 1913, ix, 93.

[19] Ueber die Behandlung der Amoeben ruhr mit Emetine, Archiv. f. Schiffs und Tropen-Hygiene, 1914, xviii, 439.

[20] Les Rechutes de la Dysenterie Amibienne et leur Traitment, Jour. des Prat., 1914, **xxviii**, 38 to 40.

It is too early to predict what the ultimate effect of such plans of treatment will be on the percentages of relapses, as prolonged observation will be necessary. The principle, however, is rational and the number of relapses should be markedly diminished. From our knowledge of the pathology of the disease and the habits of the organisms it was scarcely to be hoped that one course of emetin or any other drug would be curative in every case.

In the treatment of carriers, emetin has not achieved much success. Local irrigations of the bowel are usually resorted to, though emetin is too irritating for this purpose. Fluidextract of ipecac may be substituted. Vedder advises high irrigation with quinin or silver nitrate solution. As it is a question of destroying resistant entamebic cysts, persistent and systematic treatment is required.

EMETIN IN PYORRHEA ALVEOLARIS. The treatment of Rigg's disease with emetin originated from the discovery of Smith and Barrett[21] that amebas were present in the gums of individuals afflicted with the disease. These investigators injected a 0.5 per cent. solution of emetin hydrochloride into the pyorrheal pockets which resulted in marked improvement of the condition. Bass and Johns[22] after an extensive investigation of over 200 cases of Rigg's disease confirmed the observations of Smith and Barrett and concluded that the disease was caused by a specific ameba (*Entamba buccalis*), which could be found in practically every case. They further improved the treatment by the subcutaneous use of the drug, injecting (in any part of the body) usually one-half grain of emetin daily for three to six days. They do not consider local injections of the drug into the gums necessary in every case, but do advise the use of a drop or two of fluidextract of ipecac on the tooth-brush at night. This will prevent further infection or relapses and may also be employed as a prophylactic measure.

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[21] Loc. cit.

[22] Further observations on pyorrhea alveolaris, Bass and Johns, New Orleans Med. and Surg. Jour., Feb., 1915, lxvii, 671.

Four cases were recently reported by the writer[23] in which the disease was apparently cured by the subcutaneous use of emetin. It is too early to consider the question of relapse in this disease or to state whether further injections or courses of emetin will be needed to maintain a cure. The tendency of amebas to encyst and the fact that emetin by needle only affects amebas in the tissues must be borne in mind. In severe cases with pus pockets a combined local and subcutaneous administration of the drug may be required to obtain the best results.

After a few injections of emetin the amebas disappear from the gums and subjective and objective improvement is quickly noted. The tendency of the gums to bleeding, usually so marked in this disease, is rapidly controlled by emetin. This apparent antihemorrhagic effect of the drug in pyorrhea alveolaris is as striking as it is in the dysenteric cases. In both instances it is probably due to the prompt destruction of the amebas in the tissues which, by their activity, are a source of constant irritation and inflammation as well as an important factor in spreading infection. Once these amebas are killed healing occurs very quickly and the bleeding stops. There is no proof[24] thus far that emetin exerts any influence on blood-pressure, coagulability of the blood, or the cell counts.[25] In spite of this the drug has been quite largely employed in the treatment of hemorrhages from many causes and organs. In three cases of hemoptysis the writer[26] was unable to observe that the drug possessed any antihemorrhagic qualities, and believes, therefore, that most of the favorable reports are due to the well-known tendency of hemorrhages to spontaneous arrest.

Very recently in five out of seventeen excised tonsils amebas have been demonstrated by Smith, Middleton, and Barrett. The exact role played by the amebas in such cases is not definitely determined. In any event they are a complicating factor and tend by their activity to keep up chronic irritation and prevent healing. The above-mentioned observers lay stress upon the fact that the amebas feed largely upon the accompanying bacteria, and in their bacterial phagocytic action they doubtless set free different endotoxins. The end results of this toxic absorption will therefore vary in their manifestations according to the kind of microörganisms ingested. In one of the nine clinical cases reported by the authors the patient suffered from a multiple arthritis. Amebas were found in the tonsils and also in the gums. Emetin in small doses apparently relieved the arthritic symptoms after the salicylates had failed.

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[23] Lyons, R., Emetin Hydrochloride in the Treatment of Amebiasis and Other Affections, read before Southern Medical Association, November 11, 1914.

[24] Flandin, Emetin in Hemoptysis, Soc. Med. des Hôp., July 18, 1913.

[25] Maurel (Bull. de l'Acad. de méd., March 24, 1914, cited from Prog. Med., December, 1914, p. 348) claims that emetin acts electively on smooth fibers and particularly on those of the bloodvessels, causing them to contract. This vasoconstriction explains, in his opinion, the influence of emetin on hemorrhage. On the other hand, Maurel states (Arch. de méd. et d'Anat. Path., May, 1914, xxvi, 3, p. 225) that the apparent beneficial action of emetin in arresting hemorrhage is all the more to be wondered at, seeing that experimentally in animals it has proved to have no action as a vasoconstrictor.

[26] Loc. cit.

That amebas may be found complicating or causing other pathological conditions is not improbable, but until this is shown to be the case the heterogenious use of the drug in all sorts of affections is hardly to be recommended, as it will tend to throw discredit upon one of the most valuable therapeutic agents we have at our command.

SUMMARY. The chief points brought out may be briefly summarized as follows:

1. Ipecac and emetin when taken by needle or by mouth act through absorption into the blood stream and exert their specific effect only on those entamebas within reach of the circulation, that is, in the tissues. Entamebas free in the lumen of the gut are apparently not affected by either the oral or subcutaneous use of emetin or ipecac.
2. It is not definitely known how or in what form ipecac and emetin are eliminated from the body, but there is some experimental evidence that the amebicidal principles of ipecac (emetin) when taken by mouth are not eliminated in the feces.
3. The failure of the emetin by needle to destroy the vegetative *Entameba coli*, a parasite simply harbored in the intestinal canal, argues against the elimination of the drug from the circulation by way of the large intestines.
4. Relapses are due to the survival of some of the entamebas probably through encystment. There is reason to believe that in the majority of relapses some of these cysts remain embedded in the tissues of the gut, only awaiting favorable conditions to become vegetative.
5. In the carrier state the entamebas are probably simply harbored in the lumen of the gut in the same manner as the coli, thereby causing no symptoms. The intestinal mucosa is in some way protected against the penetration of the organism.
6. Emetin is best administered subcutaneously. Small, repeated injections are to be preferred, as they are more rapidly absorbed and the effect is maintained. In severe cases emetin should be used intravenously.
7. The oral administration of emetin is not advisable because of the intestinal irritation that results. The whole drug is preferable for this route. For the same reason emetin is not suited for colonic irrigations.
8. In an ordinary case of amebic dysentery an average of one grain daily or less is sufficient. The duration of the treatment is from one to two weeks. Too large doses or too prolonged use of

moderate doses may cause a diarrhea or be responsible for its persistence. There is increasing evidence that large doses of emetin are not without ill effect.

9. In order to prevent relapses an intermittent form of treatment should be instituted in every case even though cysts are not found.
10. Emetin, subcutaneously and locally, has been shown to be practically specific in pyorrhea alveolaris.
11. The use of emetin in hemorrhagic conditions is entirely empirical and its value is questionable.

TREATMENT OF SCOLIOSIS.

By James K. Young, M.D.,

ASSOCIATE PROFESSOR OF ORTHOPEDIC SURGERY IN THE UNIVERSITY OF PENNSYLVANIA; PROFESSOR OF ORTHOPEDIC SURGERY IN THE PHILADELPHIA POLYCLINIC; PROFESSOR OF ORTHOPEDIC SURGERY IN THE WOMAN'S MEDICAL COLLEGE, ETC., PHILADELPHIA.

There are two principal forms of lateral curvature of the spine which present themselves to the practitioner's attention, (1) the functional or the static form, and (2) the rotary or the organic variety. So much attention has been given of late to the treatment of the rotary form that the consideration of the functional type has been largely neglected. Since many of the rotary cases have at some period been of the functional type, and have taken on the rotary form through neglect or inefficient treatment, the consideration of the functional form becomes a matter of paramount importance. In order to determine the presence of the primary form it is necessary to recognize the functional type of the affection and to distinguish it from the rotary or organic type. This can be determined by:

1. The history of the case. There are certain etiological factors which should always first be considered before undertaking the treatment of any case of scoliosis. The history should include the birth, whether natural or instrumental; if employed, the occupation; the age at the onset of the affection; any visual errors; the effect of puberty or of any antecedent illness which might have led to general debility, such as fevers, pulmonary affections, acute exanthemata of youth; the diet from birth, especially such as would tend to produce rickets; inherited tendencies, especially tuberculosis; the inheritance or acquisition of nervous affections, such as dystrophies, infantile paralysis, unilateral development; congenital defects of the spine; or the loss of a member from congenital absence, disease, injury; or finally the inequality of the